



## Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

great navigable stream. It is the more necessary, since the St. Lawrence has become a common highway of trade from the teeming West to Europe; and it is equally with the Mississippi, the scene of a vast steamboating interest.

## DEPARTMENT OF STATISTICS.

### STATISTICS OF GUANO.

GUANO or "luanu" is a Peruvian or Quichua word, signifying "manure." In commerce the name is applied to a peculiar fertilizer, found in its greatest essential strength in rainless regions, and mainly on islands and rocky promontories. It is simply the dung or excrement of sea-fowls, (and sometimes of turtles and seals,) which has been accumulating through uncouthed ages; and which on the group of Chincha, off the coast of Peru—according to Humboldt—has attained the enormous depth of 50 to 60 feet. In three hundred years, however, the deposits had not increased for more than a third to half an inch, and hence where the greatest accumulation has occurred, the process of formation must have been going on from times long anterior to either traditional or written history.

Though the true nature of this substance was not known to the civilized world before the visit of Humboldt to South America, it was well known to the subjects of the Incas; and in all the works relating to the ancient agriculture of the Peruvians, its value as a fertilizer is spoken of. The early navigators were also cognizant of the guano islands, and had seen cargoes of this deposit conveyed from the islands to the adjacent mainland, and witnessed its effects in stimulating the growth of crops.

On his return from South America in 1806, Humboldt transmitted samples of this substance to the chemists Fourcroy and Vauquelin of Paris. Their elaborate analysis, published in the "*Annales de Chimie*," (vol. 56,) introduced it fairly to the scientific world, and caused its real importance to be fully recognized. In 1810 Gen. Beatson, then on the Island of St. Helena, at the suggestion of Sir Joseph Banks, made an elaborate series of experiments with

guano on the potato, which were interesting alike from their novelty and from their useful results. But no practical application was made of this substance either in Europe or the United States until 1824, in which year the late Mr. Skinner, then editor of the *American Farmer*, received two barrels of it at Baltimore. This first importation into this country was distributed in small parcels for experiment; and one of the recipients, ex-Gov. Lloyd of Maryland, pronounced it to be "the most powerful manure he had ever seen applied to Indian corn."

Years elapsed, and no further means were taken to bring it into use. True, that in the meantime both Europe and North America had received samples from Peru, but only in such quantities as to constitute them rather matters of curiosity than utilitarian in purpose. In 1840, twenty barrels were received in England. But notwithstanding the astonishing results from its application to the soil, the fear that the enormous crops realized under its stimulus might exhaust the land of its productive elements, deterred the great body of the farmers from availing themselves of so valuable a fertilizer. Repeated experiments, however, at length convinced the most sceptical of the error of this prejudice, and at the same time that the new commodity was the safest, cheapest, and most potent of known manures. Its consumption now became general, and the guano trade expanded rapidly into a vast commercial and industrial interest.

The imports into the United Kingdom from the commencement of the trade to the end of the year 1857, amounted to 2,373,308 tons, and year by year as follows:

	Tons		Tons		Tons
1841....	2,881	1847....	82,392	1853....	123,166
1842....	20,398	1848....	71,414	1854....	235,111
1843....	3,002	1849....	83,438	1855....	305,061
1844....	104,251	1850....	116,925	1856....	191,501
1845....	283,300	1851....	243,014	1857....	288,362
1846....	89,203	1852....	129,889		(2,373,506 tons.)

These figures, it must be understood, include also the quantities re-exported, which must have been to a considerable amount—chiefly to the continent of Europe. The principal sources from which this supply was procured, are noted

in the following table. The minor and indirect sources are aggregated under a common head.

Year	W. Coast of Africa.	Br. Poss. in S. Afr.	Chile.	South America.	Other sources.
1841.....	.....	.....	819	2,062	.....
1842.....	.....	.....	6,167	14,231	.....
1843.....	.....	.....	1,234	1,589	.....
1844.....	.....	.....	175	9,743	882
1845.....	.....	.....	76,898	263	4
1846.....	.....	.....	207,679	46,848	3,016
1847.....	.....	.....	5,309	1,713	5,463
1848.....	.....	.....	1,146	10,430	835
1849.....	.....	.....	950	57,762	244
1850.....	.....	.....	3,345	61,055	503
1851.....	.....	.....	2,625	73,567	3,240
1852.....	.....	.....	3,184	93,083	2,789
1853.....	.....	.....	6,183	199,732	9,672
1854.....	.....	.....	10,165	6,719	7,445
1855.....	.....	.....	86,293	6,213	7,282
1856.....	.....	.....	4,192	1,068	2,209
1857.....	.....	.....	880	.....	9,115
1858.....	.....	.....	4,249	.....	44,089
1859.....	.....	.....	5,437	.....	8,304
1860.....	.....	.....	991	.....	22,664
1861.....	.....	.....	1,022	.....	.....
1862.....	.....	.....	.....	.....	.....
1863.....	.....	.....	.....	.....	.....
1864.....	.....	.....	.....	.....	.....
1865.....	.....	.....	.....	.....	.....
1866.....	.....	.....	.....	.....	.....
1867.....	.....	.....	.....	.....	.....
1868.....	.....	.....	.....	.....	.....
1869.....	.....	.....	.....	.....	.....
1870.....	.....	.....	.....	.....	.....
1871.....	.....	.....	.....	.....	.....
1872.....	.....	.....	.....	.....	.....
1873.....	.....	.....	.....	.....	.....
1874.....	.....	.....	.....	.....	.....
1875.....	.....	.....	.....	.....	.....
1876.....	.....	.....	.....	.....	.....
1877.....	.....	.....	.....	.....	.....
1878.....	.....	.....	.....	.....	.....
1879.....	.....	.....	.....	.....	.....
1880.....	.....	.....	.....	.....	.....
1881.....	.....	.....	.....	.....	.....
1882.....	.....	.....	.....	.....	.....
1883.....	.....	.....	.....	.....	.....
1884.....	.....	.....	.....	.....	.....
1885.....	.....	.....	.....	.....	.....
1886.....	.....	.....	.....	.....	.....
1887.....	.....	.....	.....	.....	.....
1888.....	.....	.....	.....	.....	.....
1889.....	.....	.....	.....	.....	.....
1890.....	.....	.....	.....	.....	.....
1891.....	.....	.....	.....	.....	.....
1892.....	.....	.....	.....	.....	.....
1893.....	.....	.....	.....	.....	.....
1894.....	.....	.....	.....	.....	.....
1895.....	.....	.....	.....	.....	.....
1896.....	.....	.....	.....	.....	.....
1897.....	.....	.....	.....	.....	.....
1898.....	.....	.....	.....	.....	.....
1899.....	.....	.....	.....	.....	.....
1900.....	.....	.....	.....	.....	.....
1901.....	.....	.....	.....	.....	.....
1902.....	.....	.....	.....	.....	.....
1903.....	.....	.....	.....	.....	.....
1904.....	.....	.....	.....	.....	.....
1905.....	.....	.....	.....	.....	.....
1906.....	.....	.....	.....	.....	.....
1907.....	.....	.....	.....	.....	.....
1908.....	.....	.....	.....	.....	.....
1909.....	.....	.....	.....	.....	.....
1910.....	.....	.....	.....	.....	.....
1911.....	.....	.....	.....	.....	.....
1912.....	.....	.....	.....	.....	.....
1913.....	.....	.....	.....	.....	.....
1914.....	.....	.....	.....	.....	.....
1915.....	.....	.....	.....	.....	.....
1916.....	.....	.....	.....	.....	.....
1917.....	.....	.....	.....	.....	.....
1918.....	.....	.....	.....	.....	.....
1919.....	.....	.....	.....	.....	.....
1920.....	.....	.....	.....	.....	.....
1921.....	.....	.....	.....	.....	.....
1922.....	.....	.....	.....	.....	.....
1923.....	.....	.....	.....	.....	.....
1924.....	.....	.....	.....	.....	.....
1925.....	.....	.....	.....	.....	.....
1926.....	.....	.....	.....	.....	.....
1927.....	.....	.....	.....	.....	.....
1928.....	.....	.....	.....	.....	.....
1929.....	.....	.....	.....	.....	.....
1930.....	.....	.....	.....	.....	.....
1931.....	.....	.....	.....	.....	.....
1932.....	.....	.....	.....	.....	.....
1933.....	.....	.....	.....	.....	.....
1934.....	.....	.....	.....	.....	.....
1935.....	.....	.....	.....	.....	.....
1936.....	.....	.....	.....	.....	.....
1937.....	.....	.....	.....	.....	.....
1938.....	.....	.....	.....	.....	.....
1939.....	.....	.....	.....	.....	.....
1940.....	.....	.....	.....	.....	.....
1941.....	.....	.....	.....	.....	.....
1942.....	.....	.....	.....	.....	.....
1943.....	.....	.....	.....	.....	.....
1944.....	.....	.....	.....	.....	.....
1945.....	.....	.....	.....	.....	.....
1946.....	.....	.....	.....	.....	.....
1947.....	.....	.....	.....	.....	.....
1948.....	.....	.....	.....	.....	.....
1949.....	.....	.....	.....	.....	.....
1950.....	.....	.....	.....	.....	.....
1951.....	.....	.....	.....	.....	.....
1952.....	.....	.....	.....	.....	.....
1953.....	.....	.....	.....	.....	.....
1954.....	.....	.....	.....	.....	.....
1955.....	.....	.....	.....	.....	.....
1956.....	.....	.....	.....	.....	.....
1957.....	.....	.....	.....	.....	.....
1958.....	.....	.....	.....	.....	.....
1959.....	.....	.....	.....	.....	.....
1960.....	.....	.....	.....	.....	.....
1961.....	.....	.....	.....	.....	.....
1962.....	.....	.....	.....	.....	.....
1963.....	.....	.....	.....	.....	.....
1964.....	.....	.....	.....	.....	.....
1965.....	.....	.....	.....	.....	.....
1966.....	.....	.....	.....	.....	.....
1967.....	.....	.....	.....	.....	.....
1968.....	.....	.....	.....	.....	.....
1969.....	.....	.....	.....	.....	.....
1970.....	.....	.....	.....	.....	.....
1971.....	.....	.....	.....	.....	.....
1972.....	.....	.....	.....	.....	.....
1973.....	.....	.....	.....	.....	.....
1974.....	.....	.....	.....	.....	.....
1975.....	.....	.....	.....	.....	.....
1976.....	.....	.....	.....	.....	.....
1977.....	.....	.....	.....	.....	.....
1978.....	.....	.....	.....	.....	.....
1979.....	.....	.....	.....	.....	.....
1980.....	.....	.....	.....	.....	.....
1981.....	.....	.....	.....	.....	.....
1982.....	.....	.....	.....	.....	.....
1983.....	.....	.....	.....	.....	.....
1984.....	.....	.....	.....	.....	.....
1985.....	.....	.....	.....	.....	.....
1986.....	.....	.....	.....	.....	.....
1987.....	.....	.....	.....	.....	.....
1988.....	.....	.....	.....	.....	.....
1989.....	.....	.....	.....	.....	.....
1990.....	.....	.....	.....	.....	.....
1991.....	.....	.....	.....	.....	.....
1992.....	.....	.....	.....	.....	.....
1993.....	.....	.....	.....	.....	.....
1994.....	.....	.....	.....	.....	.....
1995.....	.....	.....	.....	.....	.....
1996.....	.....	.....	.....	.....	.....
1997.....	.....	.....	.....	.....	.....
1998.....	.....	.....	.....	.....	.....
1999.....	.....	.....	.....	.....	.....
2000.....	.....	.....	.....	.....	.....
2001.....	.....	.....	.....	.....	.....
2002.....	.....	.....	.....	.....	.....
2003.....	.....	.....	.....	.....	.....
2004.....	.....	.....	.....	.....	.....
2005.....	.....	.....	.....	.....	.....
2006.....	.....	.....	.....	.....	.....
2007.....	.....	.....	.....	.....	.....
2008.....	.....	.....	.....	.....	.....
2009.....	.....	.....	.....	.....	.....
2010.....	.....	.....	.....	.....	.....
2011.....	.....	.....	.....	.....	.....
2012.....	.....	.....	.....	.....	.....
2013.....	.....	.....	.....	.....	.....
2014.....	.....	.....	.....	.....	.....
2015.....	.....	.....	.....	.....	.....
2016.....	.....	.....	.....	.....	.....
2017.....	.....	.....	.....	.....	.....
2018.....	.....	.....	.....	.....	.....
2019.....	.....	.....	.....	.....	.....
2020.....	.....	.....	.....	.....	.....
2021.....	.....	.....	.....	.....	.....
2022.....	.....	.....	.....	.....	.....
2023.....	.....	.....	.....	.....	.....
2024.....	.....	.....	.....	.....	.....
2025.....	.....	.....	.....	.....	.....
2026.....	.....	.....	.....	.....	.....
2027.....	.....	.....	.....	.....	.....
2028.....	.....	.....	.....	.....	.....
2029.....	.....	.....	.....	.....	.....
2030.....	.....	.....	.....	.....	.....
2031.....	.....	.....	.....	.....	.....
2032.....	.....	.....	.....	.....	.....
2033.....	.....	.....	.....	.....	.....
2034.....	.....	.....	.....	.....	.....
2035.....	.....	.....	.....	.....	.....
2036.....	.....	.....	.....	.....	.....
2037.....	.....	.....	.....	.....	.....
2038.....	.....	.....	.....	.....	.....
2039.....	.....	.....	.....	.....	.....
2040.....	.....	.....	.....	.....	.....
2041.....	.....	.....	.....	.....	.....
2042.....	.....	.....	.....	.....	.....
2043.....	.....	.....	.....	.....	.....
2044.....	.....	.....	.....	.....	.....
2045.....	.....	.....	.....	.....	.....
2046.....	.....	.....	.....	.....	.....
2047.....	.....	.....	.....	.....	.....
2048.....	.....	.....	.....	.....	.....
2049.....	.....	.....	.....	.....	.....
2050.....	.....	.....	.....	.....	.....
2051.....	.....	.....	.....	.....	.....
2052.....	.....	.....	.....	.....	.....
2053.....	.....	.....	.....	.....	.....
2054.....	.....	.....	.....	.....	.....
2055.....	.....	.....	.....	.....	.....
2056.....	.....	.....	.....	.....	.....
2057.....	.....	.....	.....	.....	.....
2058.....	.....	.....	.....	.....	.....
2059.....	.....	.....	.....	.....	.....
2060.....	.....	.....	.....	.....	.....
2061.....	.....	.....	.....	.....	.....
2062.....	.....	.....	.....	.....	.....
2063.....	.....	.....	.....	.....	.....
2064.....	.....	.....	.....	.....	.....
2065.....	.....	.....	.....	.....	.....
2066.....	.....	.....	.....	.....	.....
2067.....	.....	.....	.....	.....	.....
2068.....	.....	.....	.....	.....	.....
2069.....	.....	.....	.....	.....	.....
2070.....	.....	.....	.....	.....	.....
2071.....	.....	.....	.....	.....	.....
2072.....	.....	.....	.....	.....	.....
2073.....	.....	.....	.....	.....	.....
2074.....	.....	.....	.....	.....	.....
2075.....	.....	.....	.....	.....	.....
2076.....	.....	.....	.....	.....	.....
2077.....	.....	.....	.....	.....	.....
2078.....	.....	.....	.....	.....	.....
2079.....	.....	.....	.....	.....	.....
2080.....	.....	.....	.....	.....	.....
2081.....	.....	.....	.....	.....	.....
2082.....	.....	.....	.....	.....	.....
2083.....	.....	.....	.....	.....	.....
2084.....	.....	.....	.....	.....	.....
2085.....	.....	.....	.....	.....	.....
2086.....	.....	.....	.....	.....	.....
2087.....	.....	.....	.....	.....	.....
2088.....	.....	.....	.....	.....	.....
2089.....	.....	.....	.....	.....	.....
2090.....	.....	.....	.....	.....	.....
2091.....	.....	.....	.....	.....	.....
2092.....	.....	.....	.....	.....	.....
2093.....	.....	.....	.....	.....	.....
2094.....	.....	.....	.....	.....	.....
2095.....	.....	.....	.....	.....	.....
2096.....	.....	.....	.....	.....	.....
2097.....	.....	.....	.....	.....	.....
2098.....	.....	.....	.....	.....	.....
2099.....	.....	.....	.....	.....	.....
2100.....	.....	.....			

The continent of Europe, with the exception, perhaps, of France and Spain, receives its supplies indirectly, chiefly by way of Great Britain; nor are statistics convenient to show to what amount it is used. The quantity shipped from Peru to Spain in 1858, was 27,160, and to France 25,545 tons—together about one-fifth of the whole exported from that country. The West India Islands are also consumers, and several of them producers also. Guano is also largely imported into Mauritius, and it is to this substance, in connection with the free importation of Coolie labor, that that island owes its rapid and sustained development. Guano is also largely used on the lands in Barbadoes—the dense population of which gives it also an abundance of labor. Mauritius and Barbadoes indeed have, from the two great elements of agricultural prosperity—guano and abundant labor—become the most flourishing sugar colonies of the British Empire, and in production have far outstripped the most prosperous of the countries in which slave-labor is used.

“Guano (we quote the Report of the Com. of Patents for 1854,) like all kinds of animal excrements, varies materially in its quality according to the nature of the food habitually used. The richer and more nutritious it is, the greater will be the fertilizing properties of the manure. Hence the dung of the highly-fed race-horse is more valuable than that of the drudge-horse released from the cart and kept upon low fare. For the very same reason the excrementitious deposits of birds feeding upon fish or flesh, afford a stronger manure than parrots or pigeons which live on berries and grain. Again, guano is very materially influenced by the age and climate in which it is found. Thus, during the first year of its deposit in Bolivia or Peru, the stratum is whitish and abounds in uric acid; but in the lower strata, which have existed perhaps for ages, the color is a rusty red, as if tinged with oxide of iron. They become progressively more and more solid from the surface downward—a circumstance naturally accounted for by the gradual

accumulation of the strata, and the evaporation of the volatile parts. In all climates subject to rains and heavy dews, the guano exposed to their influence undergoes fermentation, loses a portion of its ammoniacal salts by the decomposition, and thereby is diminished in value. The excrement of the birds, when first deposited, is rich in nitrogenous compounds. No ammonia, as such, exists among its constituents; but the access of air and moisture induces a slow decomposition by which ammonia is generated, and when the circumstances are favorable it escapes into the atmosphere. Wherever moisture is abundant these changes are most rapidly affected; whereas, on the other hand, a dry climate and a rapid accumulation of the deposit are more likely to insure its preservation in a comparatively unchanged state.”

From these remarks it is obvious that the composition, and consequently the value of the different kinds of guano, will vary according to age and the localities from which they are obtained. The varieties best known to commerce are the Peruvian, Bolivian, Chilean, Patagonian, Ecuadorian, Mexican, Central American, West Indian, and African, (Ichaboe and Saldanha Bay,) etc. They may also be classed in conformity with their chemical composition, or as follows:

Equadorian.....	} Ammoniacal.
Peruvian, (Chincha)	
Bolivian, (Angamos)	
Chilean, (fine).....	
Chilean, (ordinary) .	} Intermediate.
Peruvian, (Lobos) ..	
Mexican .....	
West Indian.....	
Ichaboe.....	
Saldanha Bay .....	} Phosphatic.
Algoa Bay .....	
Patagonian.....	
Shark's Bay, (Aus.)	

*Peruvian* guano is found on the islands and coasts between the 6th and 21st degrees of south latitude. The government report of 1853 divides the huancas or deposits into three grand sections: the *southern* embracing the coast from the limits of Bolivia to Arica; the *middle*, comprising those between Arica and

Callao; and finally, the *northern*, including the remainder between Callao and Paita.

The "southern section" bears the local names of Chipana, Huanillas, Punta de Lobos, Pabellon de Pica, Puerto Ingles, Iquique and Patillos, Punta Grande, etc. The *Chipana* deposit is situated in lat.  $21^{\circ} 22'$  south, and consists of a table-rock from twenty-five to fifty yards above the sea. The *Huanillas* lies in lat.  $21^{\circ} 18'$  south, and consists of four quebrados or valleys, in which are the deposits. The *Punta de Lobos* is a rocky point in lat.  $21^{\circ} 06'$  south. The guano lies in the valleys in layers with a mean height of fifteen to twenty yards. The *Pabellon de Pica* is a tent-shaped hill near the village of Pica, in lat.  $20^{\circ} 57'$ . The guano of this deposit is found in crevices of varying depths. The guano of *Puerto Ingles*, about a quarter of a mile distant from the Pabellon, on a small peninsula, forms an eminence upwards of 500 yards long by 250 to 300 yards in breadth, on which are large huaneras. The islands of *Iquique* and *Patillos* lie to the north of the Pabellon and Puerto Ingles in lat.  $20^{\circ} 46'$  south, the former in the bay of the same name. Both were important deposits in by-gone ages, but are now exhausted. The promontory in lat.  $20^{\circ} 23'$  is called *Punta Grande*, and the guano is found in several valleys facing the sea. *Punta Grande* being in proximity to the Morro of Tarapaca, which is a kind of sand-hill, the guano in the deposit is covered with heavy layers of sand, and hence it is difficult to estimate its contents. These are said, however, to be immense; and there are many reasons also for believing that these deposits were used in the time of the Incas. Besides the deposits particularly noticed, there are smaller ones of white fresh guano upon different rocks and points between Iquique and Punta Grande, and at Pisagua—a small landing place to the north of the Punta, from which the manure is taken for the use of the coast region. There are also localities belonging to individuals. Probably the total amount of guano in the whole southern region, may be estimated at 10,000,000 tons, of which 7,921,407 tons have

been estimated for in the five first deposits, Chipana, Huanillas, Punta de Lobos, Pabellon de Pica and Puerto Ingles; and which are herewith recapitulated:

	Tons.
Chipana.....	280,602
Huanillas.....	1,912,505
Punta de Lobos.....	1,460,790
Pabellon de Pica.....	2,975,000
Puerto Ingles.....	1,292,510
Total.....	7,921,407

The "middle section" consists of the *Chincha Islands* in lat.  $13^{\circ} 32'$  south, and nearly opposite to Pisco. Some guano is also found on the cliffs of Corredas and Viejos, and on the small island of Ballesta, but the quantity is small and not material to the estimate of the district. It is from these islands that the guano sent to foreign markets is chiefly extracted, and the quantity here accumulated is greater than in all the "huaneras" collectively. The quantity of manure on these islands has been variously estimated—in 1842 by Senor Jose Villa, in 1847 by Senor Rivero, and in 1853 by a government commission. The results of each estimate are herewith given:

	Estimate of Villa.	Estimate of Rivero.	Estimate of Government.
North Island ...	28,925,571	7,600,000	4,189,477
Middle Island ...	17,707,709	6,450,000	2,505,948
South Island ...		4,200,000	5,680,675
Total (tons) ..	46,632,280	18,250,000	12,376,100

An estimate by Admiral Moresby, (also in 1853,) reduces the amount to 8,600,000, of which 5,500,000 tons are attributed to the North Island, 1,500,000 tons to the Middle Island, and 1,600,000 tons to the South Island. Probably the estimate made by the government commission is nearest the truth. Taking this as the basis of calculation, and estimating the annual removal of the deposit at 300,000 tons, we arrive at the conclusion that the whole may be carried off in the next 41 years.

The "northern section" consists mostly of small islands, very low, and exposed to the winds. The layers of guano are not usually deep, and the deposits are frequently mixed with sand. They will eventually, however, become more valuable, as they are now the resort

of the vast clouds of birds which the operations at the Chincha group have driven northward; and thus, when the wealth of the one section is exhausted, the other will supply its place. The islands of this section may be divided into four groups, viz.: the Lobos de Tierra, the Lobos de Fuera, the Guanape, and the island of Ferrol. The *Lobos de Tierra* (5° 06' S.) group consists of a principal island, and the islands of Bermeja, Felix Gonzales and Colorado. The *Lobos de Fuera* is two islands lying in lat. 7° 03' S., and separated by a very narrow channel. The guano of this group is mixed with the excrements of the sea-lions, (*lobos*), which are here very numerous. The *Guanape Islands* are two in number, lying in lat. 8° 36' S., and about five miles from the coast. Only the northern island contains guano. The island of *Ferrol* is a small island in lat. 9° 07' S. The extent of the guano deposits on the islands of the northern section, as above defined, is shown by the following table:

Groups, etc.	Tons of guano.
Lobos de Tierra .....	477,858
Lobos de Fuera .....	265,743
Guanape Islands .....	79,800
Island of Ferrol .....	30,700
Total .....	854,101

Aggregating the sums of each of the three sections of the Peruvian deposits, the following will be the result:

Southern Section .....	7,921,407 tons.
Middle Section .....	12,376,100 "
Northern Section .....	854,101 "
Total .....	21,151,608 "

In addition to the deposits above enumerated, guano is also found in small quantities on the islands of Malabrigo (lat. 7° 49'), San Martin or Dona Maria (lat. 11° 04'), Mazorque (lat. 11° 25'), Pescadores (lat. 11° 46'), Las Hormigas (lat. 11° 56'), and El Pelado in lat. 11° 35' south. The island of Santa, in lat. 9° 11', contains only a few tons of recent guano; but it is probably destined to become an important deposit, since, of late years, its large area has become the resort of myriads of birds, and the guano is rapidly accumulating.

These guano deposits are of immense value

to Peru, and the sale thereof yields to the nation five-eighths of the public income. In 1857 the income amounted to \$8,656,256, of which \$5,296,952 were derived from this source. The quantity shipped during the years 1856-'57, and 1857-'58, and the destination of the material, is stated as follows:

Destination.	1857-'57.	1857-'58.
England and the Continent .....	181,134	151,333
Spain .....	7,874	27,160
France .....	14,101	25,545
Australia .....	.....	1,523
Mauritius .....	.....	7,228
United States .....	51,943	51,253
Barbadoes .....	.....	2,667
Asia .....	1,929	.....
Total (Peruvian tons) ..	256,981	266,709

*Bolivian* (or *Angamos*) guano is found in many spots along the coast bordering on the desert of Atacama. Pacquica is the principal port from which it is shipped. As a fertilizer it ranks next to the guano of the Chincha Islands, being the product of a region but a few degrees southward, and in which rain never falls. But the deposits are frequently buried in sand, and the guano oftentimes mixed or adulterated therewith. These circumstances add largely to the cost of shipping, and have tended greatly to depreciate its real value in the markets. The shipments have been wholly on British account, and up to 1858 had amounted only to 24,667 tons.

*Chilian* guano has been found chiefly in the vicinity of the desert of Atacama, on the northern frontier—is generally of a very inferior quality, and the deposits may be said to be nearly exhausted. There are, however, other deposits further south; and another and a very valuable variety, although rare, is exported from Valparaiso. This latter is said to be collected from the rocks, and is a recent deposit. It is quite hard, and comes to this country in large pale-yellowish masses, and in value is said to be equal to that of the best Peruvian. Between 1848 and 1858, both years inclusive, only 8,847 tons of Chilian guano have been imported into the United States.

*Putagonian* guano is inferior in value to that found on the coasts nearer the equator, inas-

much as the deposits have been deprived of their salts by the frequent rains of the climate. The guano of this region indeed is almost wanting in ammonia; and it is always mixed with sand, sometimes to the amount of one-third the unit. Very little, if any, of this deposit has been brought to the United States, and to 1858 only 73,485 tons had been landed in England.

*Equadorian* guano is brought from the Galapago Islands, which belong to the Republic of Equador. This group lies some six hundred miles west of the mainland, and consists of four considerable and a large number of smaller islands and islets. The shores abound in turtle, (hence the name, Galapagos,) and are frequented by myriads of aquatic fowls. From the latter the guano of these islands is derived. Of this deposit only 525 tons have reached the United States. It is, however, according to the analysis of Prof. Horsford, rich in ammonia, the sample examined by him having contained 15.59 per cent. of that substance; and hence it probably ranks with the average qualities of the Peruvian stock. The islands near the Equadorian coast, and also those near the coast of New Granada on both seas, contain deposits of this fertilizer of greater or less extent.

*Mexico and Central America* have deposits on the headlands and islands on both the east and west coasts. The locality will vary in the composition of the several varieties. In some parts of the Pacific coast, where the climate is nearly rainless, the deposits will be essentially ammoniacal. Where the rains are frequent and heavy, their value will depend on the amount of their phosphates. But as yet little is known of these brands. On the Pacific side the largest known deposits have been found on the three islands called the Marias. In the vast stretch of coast from the Isthmus of Darien to the head of the Gulf of California, however, there is ample space for future discovery. On the Atlantic side of these countries, the guano is of an entirely different character from that found on the Pacific coast, and in some instances has yielded as much as 60 per cent. of the phosphate of lime. The island group called the

Triangles, near the coast of Yucatan, is the chief known source of Mexican guano. Small shipments have been made annually into both England and the United States since 1851.

*West Indian* guano is found abundantly on the solitary rocks and islets which stud the Caribbean Sea, and the neighboring ocean. The island of Aves, or Bird Island, (the possession of which is now contested between the Venezuelan and Dutch governments,) is the richest source of phosphate guano hitherto discovered. Some samples have yielded 84 per cent. of dry super-phosphate of lime, or one-third more than pure ground bones. It is very remarkable for its little moisture. Of dry organic matter and ammonia, the proportion is  $6\frac{1}{2}$  per cent. There are also workable deposits on Navasa island off the southwest peninsula of Hayti; and there are large deposits on the peninsula of Samana, and also on the Florida Keys. With the exception, however, of the Bird Island deposit, these have not been disturbed. The guano of this island is known to commerce as Venezuelan.

*Western and Southern Africa* have yielded large quantities of guano, which have been collected chiefly at two points, Saldanha Bay and Ichaboe. The guano of Saldanha Bay, like that of Patagonia, comes from a latitude and climate subject to heavy rains, and consequently loses the greatest part of its ammonia, unless collected in a very recent state. It derives its chief value from its phosphates, which range higher than those of any other known variety except those of Mexico and the West Indies. Ichaboe guano is now nearly exhausted, and where found in the markets is a recent deposit made from day to day, and collected by hand from the rocks. This new guano is much more valuable than the old, the latter having been exposed to the wind and rain of centuries, and lost nearly all its ammonia. It approaches in composition that of the Chincha Islands, but it is remarkable as containing a considerable percentage of carbonate of lime, which is entirely wanting in the Peruvian variety.

In the course of our remarks, we have incidentally referred to the composition of the sev-





Congress alone can grant the *exclusive* right of occupation for the purpose of obtaining and of selling the guano to citizens of the United States; but "nothing in this act contained shall be construed obligatory on the United States to retain possession of the islands, rocks or keys aforesaid, after the guano shall have been removed from the same." The trade between the islands and the ports of the United States is to be considered as a branch of the coasting trade, and regulated as between different parts of the United States. The President is authorized, at his discretion, to employ the land and naval forces to protect the rights of discoverers; and, "until otherwise provided by law, all acts done, and offences or crimes committed on every such island, or in the waters adjacent thereto, shall be held and deemed to have been done or committed on the high seas, and be punished according to the laws of the United States.

The advantages of this law to the American merchant and navigator are apparent, and have been followed by a vast amount of exploration and discovery, both by individuals and associations. Up to the commencement of 1859, no less than forty-nine guano islands and island groups have been discovered in the Pacific Ocean, and taken possession of by Americans. These are named in the following list, (all notified to the State Department,) which also gives the astronomical position of each:

	Latitude.	Longitude.
Baker's .....	0° 15' S.	176° 21' W.
Jarvis .....	0° 21' S.	159° 52' W.
Howland .....	0° 50' N.	176° 52' W.
Malden's .....	4° 15' S.	155° 00' W.
Arthur's .....	3° 32' S.	176° 05' W.
Christmas .....	1° 58' N.	157° 32' W.
Caroline .....	9° 54' S.	150° 07' W.
Ann's .....	9° 49' S.	151° 15' W.
Staver's .....	10° 05' S.	152° 16' W.
Flint's .....	11° 26' S.	151° 48' W.
Bauman's .....	11° 48' S.	154° 10' W.
Rogewein's .....	11° 00' S.	156° 07' W.
Groninque .....	10° 00' S.	156° 44' W.
Frienhaven .....	10° 00' S.	156° 59' W.
Quiro's .....	10° 32' S.	170° 12' W.
Low .....	9° 33' S.	170° 38' W.
Clarence .....	9° 07' S.	171° 40' W.
Favorite .....	2° 50' S.	176° 40' W.
Duke of York .....	8° 30' S.	172° 10' W.
Farmer's .....	3° 00' S.	170° 50' W.

	Latitude.	Longitude.
Birnie's .....	3° 35' S.	171° 39' W.
Phenix .....	3° 40' S.	170° 52' W.
Mary's .....	2° 53' S.	172° 00' W.
Enderbury's .....	3° 08' S.	174° 14' W.
Sydney .....	4° 20' S.	171° 00' W.
Penhryn's .....	8° 55' S.	158° 07' W.
Pescado .....	10° 39' S.	159° 20' W.
Ganges .....	10° 59' S.	160° 55' W.
Rierson's .....	10° 10' S.	160° 53' W.
Sideron's .....	11° 05' S.	161° 50' W.
Humphrey's .....	10° 40' S.	160° 52' W.
Frances .....	9° 58' S.	161° 40' W.
Flint .....	10° 32' S.	162° 05' W.
Nassau .....	11° 32' S.	165° 30' W.
Danger .....	10° 00' S.	165° 56' W.
Mary Letitia's .....	4° 40' S.	173° 20' W.
Kenin's .....	4° 41' S.	173° 44' W.
Walker's .....	3° 58' N.	149° 10' W.
Sarah Anne .....	4° 00' N.	154° 22' W.
America .....	3° 40' N.	159° 28' W.
Prospect .....	4° 42' N.	161° 38' W.
Samarang .....	5° 10' N.	162° 20' W.
Palmyro .....	5° 48' N.	162° 20' W.
Danger .....	6° 30' N.	162° 32' W.
Makin .....	3° 02' N.	172° 46' W.
Mathew's .....	2° 05' N.	173° 26' W.
David's .....	0° 40' N.	170° 10' W.
Barber's .....	8° 54' N.	178° 00' W.

The two first-named islands have been claimed by the American Guano Company, and the rest by the United States' Guano Company, and individual citizens of the United States.

These acquisitions are all to be surveyed and charted, and the quality and quantity of the guano thereon, to be ascertained by competent analytical chemists and topographical engineers, and a report thereof made to Congress at the earliest practicable period. At some of these islands there are good harbors and safe anchorage, and at others of them there is a good lee; which conditions, coupled with the fact that generally they are situated where storms are seldom known (the prevailing winds being from the east), make them places of safe resort for ships.

The quantity and accessibility of the guano on many of these islands is placed beyond doubt. What remains to be demonstrated is its quality, and whether that is such as to warrant its importation. Generally the guano of the Pacific Isles is that classed as phosphatic, and contains also sulphate of lime and other salts. Little, however, has been brought into the Atlantic States. In 1857 some seventy or eighty tons were imported into New York in the ship

Aspasia; and yet, with such limited quantity, experiments have been made which have proved its value as a fertilizer; and its success has led to a demand which will insure an immediate and thorough trial of its powers.

The accounts of the operations of the companies and individuals operating in the Pacific are very meagre, and not at all connected. From the latest, which appear in the "N. Y. Tribune" of the 28th May, 1859, we learn that the American Guano Company (which has its Pacific headquarters at Honolulu, and its principal seat in New York) has been very successful at Jarvis' Island, and had already carried into Honolulu between 13,500 and 14,000 tons of guano. Considerable quantities had also been landed at San Francisco. The value of this guano in New York is about \$40 per ton.

From the brief survey of the localities of this material of commerce, which it has been the object of this paper to portray, it is evident that, in one form or other, guano is not that scarce article which our incomplete information would lead us to prejudge. It is found, indeed, in all the solitudes of the earth, and is daily being accumulated, and will ever be on the increase, so long as the sea-bird finds a home on the coasts and promontories, or on the islands of the great ocean. The demands of commerce and agriculture, be they ever so vast, cannot, therefore, exhaust the rich stores of nature. They may clear away existing deposits—laying bare the rocks which are now covered with the animal refuse of ages, but again and again, so provident is nature, and so prodigal in her gifts to man, will the bird return to its habitat, and renew, layer by layer, the so valued mass; and and when driven away for a time, it but seeks another scene for its operations. In all this may we not trace the hand of a wise Providence, who thus has provided a panacea against the improvidence of man, and stored up a treasure that brings fertility and productiveness to the lands which, through ignorance and folly, he has converted into a wilderness, and rendered unfit for his habitation. R. S. F.

## STATISTICS OF AMERICAN STATES.

NO. 6.

## REPUBLIC OF URUGUAY.

Lat. 29° 20' to 34° 58' S. | Populat'n (1856), 177,300.  
Long. 52° 38' to 56° 31' W. | Density, 2.41 to sq. mile.  
Area, 73,538 sq. miles. | Capital, MONTEVIDEO.

## GOVERNMENT.

*Executive.*—President, elected for four years. The present President, Don Gabriel Antonio Pereira, was elected on the 1st March, 1856. The Vice-President (Don Bernardo P. Berro) is elected for the same term as the President.

*Administration.*—The Ministers—1st, of foreign relations and internal administration; 2d, of finance, and 3d, of war and marine.

*Legislature.*—A Senate and House of Representative, the members of which are elected by the people.

*Judiciary.*—A Supreme Court at Montevideo, and courts of superior jurisdiction at Montevideo, Colonia and Maldonado.

*Religion.*—The Holy Apostolic Roman Catholic.

## POPULATION IN DEPARTMENTS.

Departments.	1856.	1829.	Incr.
Montevideo .....	43,520	23,404	20,116
Gundalupo (Canelones) ..	13,600	7,800	5,800
San Jose .....	13,500 }	8,090	13,820
Florida .....	9,400 }		
Colonia del Sacramento ..	10,320	9,706	614
Soriano .....	13,200	13,200	....
Paysandu .....	11,200 }		
Salto .....	14,300 }	27,900	6,660
Tacuarembó .....	9,060 }		
Cerro Largo .....	10,100	10,100	....
Maldonado .....	12,600 }	21,296	604
Minas .....	9,300 }		
Durazno, or Entre Yi y			
Rio Negro .....	8,200	6,826	1,374
Total .....	177,300	128,312	48,988

*Chief Towns.*—Montevideo, Colonia and Maldonado. Montevideo has about 35,000 inhabitants. Besides these, there are 15 smaller towns, and 8 pueblos.

## FINANCES (1856).

Receipts .....	\$2,132,800	Deficit,
Expenditures .....	3,280,745	\$1,147,945
Public Debt (1853) .....	about \$10,000,000	

## COMMERCE (1855-'56).

1.—Value of Exports and Imports.			
Years.	Imports.	Exports.	Total.
1855 .....	\$4,504,987	\$3,791,249	\$13,296,236
1856 .....	4,586,317	10,303,853	14,890,170
Increase.	\$81,330	\$1,512,604	\$1,593,934